Disease Management In Australian Pistachio Orchards

Pathogens are in our orchards

- This years pathogen survey (BUDMON) has shown that Colletotrichum and BOT are wide-spread in our industry.

- These two pathogens are present in almost all paddocks.

- The percentage infected buds does vary greatly from far-to-farm and paddock-to-paddock.

Colletotrichum acutatum (Cause of anthracnose disease)

- Found in buds collected from all growing regions.
- Up to 15% infected buds found
- 1-10% infected buds commonly found
- 0% infected buds uncommon
- For this pathogen to cause severe disease, warm, humid conditions required (Don’t mention the war!)
- Colletotrichum’s role in the elevated levels of shell staining is unclear but is likely to contribute
- We understand little about anthracnose of pistachio as no research has been conducted globally

Botryosphaeriales (Cause of 'BOT' disease)

- A BIGGER problem than industry has anticipated!
- Found in buds collected from all growing regions.
- Up to 50% infected buds found
- >4% infected buds commonly found – this is the action threshold for BOT in California
- Much more is known about this disease because of the impact it has had in California
- It is likely to contribute to shell-staining in Australia

Alternaria spp.

- In every bud collected; thus, it's role/if any, in the cause of shell staining is unclear.
  - Why do we see 100% Alternaria 'infected' buds but we see large variations in shell-staining?
    - Weather?
    - Disease management practices?
    - Fungicide use?

Integrated Disease Management (IDM)

- The levels of BOT alone suggests that the industry needs to improve its disease management culture
- This was underlined by the grower survey conducted a year ago:
  - Poor understanding of disease monitoring and how to use or do it (i.e. BUDMON and ONFIT)
  - Poorer understanding of what pathogens are present in our orchards
  - The need for fungicides not broadly considered
- The pathogen levels we are seeing may provide some explanation for the high baseline shell-staining

Integrated Disease Management (IDM)

- The cornerstone of improving disease management is monitoring
  - BUDMON (By end of August)
    - Tells you what your potential disease issue is at the beginning of the season
    - Across seasons can provide some insight into effectiveness of hygiene practices i.e. pruning and shaking
  - ONFIT (By end of December)
    - Provides you with a disease potential for the season
    - Provides some insight to the effectiveness of your other disease management practices i.e. fungicide use
- Only through monitoring can you make effective disease management decisions

Integrated Disease Management (IDM)

Hygiene **IS** important:

– Rachises (2014 harvest) recently collected from an Australian orchard. These were placed in warm, humid conditions to encourage fungal growth. Note reddish-pink fungal growth emanating from rachises (yellow arrows) which is the fungus that causes Anthracnose disease - Colletotrichum

Integrated Disease Management (IDM)

- Mummified nuts collected from trees of the same orchard. These were placed warm, humid conditions to encourage fungal growth. Note reddish-pink fungal growth on the nuts (yellow arrow) which is the fungus that causes Anthracnose disease. Note the olive-grey fungal growth (red arrow) which includes the fungus that causes BOT disease.

Integrated Disease Management (IDM)

- When armed with monitoring results you can make meaningful management decisions

BUDMON Results / Orchard Condition	BUDMON Results indicate low level of the pathogens which cause BOT and Anthracnose	We have not done BUDMON or our BUDMON results show that we have moderate to high levels of the pathogens which cause BOT and/or Anthracnose
Low levels of blighted wood and old rachises and mummified nuts have been shaken from the trees. The level of shell-staining amongst last year's harvest was at or below average for the industry	Consider a protectant fungicide-spray program and confirm disease levels later in the season by undertaking an ONFIT test	Conduct a BUDMON test if you haven't done so to confirm pathogen levels. Consider a curative fungicide-spray program should be considered. Monitor disease levels later in the season by under-taking an ONFIT test.
Shaking has not occurred and we have high levels of old rachises and mummified nuts and we have blighted wood is not difficult to find in our trees. The shell-staining on nuts from last year's harvest was equal to or greater than the industry average	Consider an orchard sanitation program which involve pruning of blighted wood and shaking of old rachises and mummified nuts, this will be the most effective, short-term measure to prevent a build-up of pathogens. Consider a protectant fungicide-spray program and confirm disease levels later in the season by undertaking an ONFIT test.	Conduct a BUDMON test if you haven't done so to confirm pathogen levels. If BUDMON results are of concern, a program of orchard sanitation will be the most effective measure to reduce pathogen levels in the short-term and will involve pruning of blighted wood and shaking of old rachises and mummified nuts. Additionally, a curative fungicide-spray program should be considered. Monitor disease levels later in the season by under-taking an ONFIT test.